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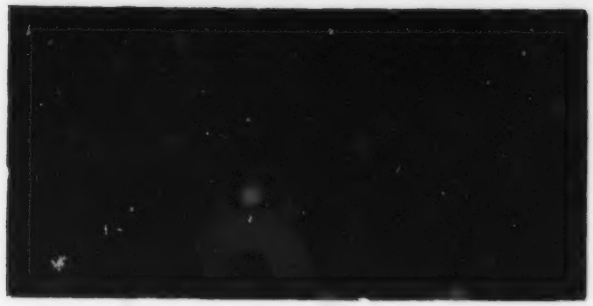

MARKET RESEARCH

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RESIDENTIAL APPLIANCE SURVEY 1986

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INTRODUCTION

This report provides the results of the thirteenth Ontario Hydro "Residential Appliance Survey". It contains an analysis of appliance ownership in Ontario homes.

The objectives of this survey were:

1. to continue the data base begun in 1960, which provides appliance ownership information by individual participating Municipal Utilities and each of Ontario Hydro's Rural Retail Areas.

2. to use the data as an input to the Residential End-Use Energy Planning System(REEPS), a residential electricity forecasting model being evaluated by Ontario Hydro.

3. to provide data to measure the effects of household characteristics and appliance ownership on electricity consumption.

4. to measure conversion and replacement rates of water and space heating systems.

This mail survey, conducted during the months of November and December 1986, was produced with the assistance and cooperation of the participating Municipal Utilities across Ontario.

June 1987

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COMMENTS ABOUT THE 1986 RESIDENTIAL APPLIANCE SURVEY

The 1986 Residential Appliance Survey had a response rate of 48.4% without a follow-up mailing. This response rate is up considerably from the 36% achieved in 1983 and the 45% achieved in 1980 (see Appendix, pages 21 and 22 for survey method and response).

This is the first year that the Residential Appliance Survey is being used as a direct input to the Residential End-Use Energy Planning System(REEPS), a recently acquired residential electricity forecasting model. As a result, the questionnaire was modified to provide the additional data needed to perform the conditional demand analysis required in the model (see page 23 for a sample of survey questionnaire).

In the 1986 survey, special care was taken to improve the question dealing with space heating. The new format considerably improved the quality of the answers to this question and provided a great deal of useful new information.

While only the computerized municipal utilities were asked to participate, the 1986 survey population represents 92% of all residential electricity consumers in Ontario.

Even though there have been some changes in questions from previous surveys, the format of this report is similar to earlier reports in order to provide the continuity needed for year to year comparisons.

HIGHLIGHTS OF THE 1986 RESIDENTIAL APPLIANCE SURVEY

APPLIANCES

Since the last survey in 1983, the ownership of microwave ovens and VCRs has exploded. The saturation level of microwaves has increased three-fold from 13% to 39% of all households while VCRs have increased almost four-fold from about 11% to 41%.

Other significant increases in saturations include frost-free refrigerators increasing from 70% to 76%, dishwashers from about 35% to 39%, and colour TVs from 87% to 94% of all households surveyed. Personal computers were surveyed for the first time in 1986 and 13% of all households now have one.

Figures on pages 19 and 20 show the changes in saturation rates of selected appliances since 1960 for Municipal and Rural Retail Residential customers, respectively.

Regional results of appliance saturations can be found on pages 13 to 18. There are no significant differences in appliance ownership by Region, except that gas cooking and gas clothes drying is more prevalent in Western Region than in the other Regions.

AIR CONDITIONING

Air conditioning in Ontario households is becoming more than a luxury, particularly central air conditioning. While room air conditioners have remained stable at about 20%, central air conditioning has moved from 13% to 19% of all households between 1983 and 1986. Just over one-third of all new homes built since 1981 have central air conditioning.

There are marked differences of air conditioning ownership by Region due to weather. The warmest Regions, Central and Western, show central air conditioning at 23% while the progressively cooler Regions Eastern, Georgian Bay, Northwestern and Northeastern at 14%, 5%, 3% and 2% respectively report significantly lower saturations.

WATER HEATING

While electric water heating saturation for all households remained stable at just under 45%, the single family saturation level fell from just under 52% to 47.6% between 1983 and 1986 (see page 10 for appliance saturation by housing type). During that period, many oil heated single family homes, which typically have electric water heating, converted to natural gas space heating. The survey shows

that 4.2% of single family households switched from electric water heating to natural gas since 1983, indicating that the water heating fuel generally changes with the space heating fuel.

Regional differences in water heating are dependent on the availablity of natural gas and the amount of unconverted oil heating. Central and Western Regions have the lowest electric water heating saturations at about 35%. Georgian Bay Region is the highest at 78%. Eastern, Northeastern and Northwestern Regions have electric water heating saturation levels of 69%, 60% and 52% respectively.

SPACE HEATING

For this year's survey, rather than asking respondents for their main heating fuel, which has caused some problems in previous surveys due to increasing numbers of dual heating systems (e.g. add-on heat pumps, plenum heaters, air-tight wood stoves), respondents were asked to check off all of the heating equipment they had in the home. This allowed us to determine what combination of heating equipment is used in the home.

In single family homes, all-electric space heating is 18.1%, and in apartments it is 28.7%. Natural gas space heating is in 57% of single family homes and in 46% of apartments. Oil space heating is in 23% of single family homes and in 5% of apartments. Although a direct comparison with the 1983 survey cannot be made, electricity and natural gas space heating have increased due to the Canadian Oil Substitution Program, while oil space heating has decreased. The 1986 survey shows that 5.6% of those in single family dwellings switched from oil heating to some other form of heating since 1983.

All-electric space heating saturation by Region varies from about 12% in Central and Western Regions to 40% in Georgian Bay Region for single family homes. Electric heating saturation in apartments is higher, varying from 23% in Central Region to 61% in Northwestern Region.

With the inventory of heating equipment by respondent available this year, dual or multiple heating fuels can be tracked. Of those in single family dwellings with a natural gas furnace, 3.9% have built-in electric baseboard heaters, 1.1% have a heat pump, and 2.9% have an air-tight wood stove. Similarly, of those households with an oil furnace, 2.6% have built-in electric baseboards, .8% have heat pumps, .3% have plenum heaters, and 3.4% have air-tight wood stoves.

Since the energy crisis in the 1970's, Ontario Hydro's Rural Areas have shown a drop in electricity consumption in electrically heated single family households. This was likely due to increased use of wood. Results of the 1986 survey confirm this trend, showing a relatively high saturation of wood-electric systems in the Regions with a larger rural base of customers. The three highest saturations of air-tight stoves in homes with some form of electric heating are in Georgian Bay, Northeastern, and Eastern Regions at 15.9%, 10.3% and 8.4% respectively.

HOUSEHOLD CHARACTERISTICS

Appliance saturations by age of single family dwelling shows central air conditioning in over 30% of the homes built after 1980 (see page 12 for appliance saturations by age of single family dwelling). Electric water heating in pre-1961 homes is just over 50%. For homes built after 1980, the saturation declines to about 38%, which is close to the penetration of electric water heating in new homes during that period. The highest saturation of electric heat can be found in homes of the 1971-1983 vintage at around 30%, while the pre-1961 vintage homes show electric heating at 11%.

Appliance saturations in single family dwellings by kw.h-use ranges follow the trends one would expect, showing high saturations of electric appliances, electric heating and water heating where annual consumption of the home is over 15,000 kw.hs (see page 11 for appliance saturations by consumption ranges). For example, almost all households with an annual consumption over 15,000 kw.hs have an electric range, a frost-free refrigerator, an electric clothes washer and dryer, and a colour T.V. In single family homes with consumption of over 30,000 kw.hs, electric water heating saturation is over 90% and all-electric space heating is at 70%.

LIST OF PARTICIPATING MUNICIPAL UTILITIES

MUNICIPAL UTILITY	REGION	MUNICIPAL UTILITY	REGION	MUNICIPAL UTILITY	REGION
AJAX	C	GRAND BEND	W	PORT HOPE	C
ALVINSTON	W	GRAVENHURST	GB	PORT STANLEY	W
AMHERSTBURG	W	GRIMSBY	W	PRESCOTT	E
ANCASTER	C	GUELPH	C	RENFREW	E
ARNPRIOR	E	HALTON HILLS	C	RICHMOND HILL	C
AURORA	C	HAMILTON	C	RIDGETOWN	W
AYLMER	W	HARROW	W	RODNEY	W
BARRIE	GB	KANATA	E	SARNIA	W
BEETON	GB	KINGSTON	E	SAULT STE MARIE	NE
BELLE RIVER	W	KINGSVILLE	W	SCARBOROUGH	C
BELLEVILLE	E	LEAMINGTON	W	SCHREIBER	NW
BELMONT	W	LINCOLN	W	SCUGOG	C
BLANDFORD-BLENHEIM	W	LINDSAY	C	SEAFORTH	W
BLENHEIM	W	LONDON	W	SIMCOE	W
BLYTH	W	MARKHAM	C	SIOUX LOOKOUT	NW
BOTHWELL	W	MEAFORD	GB	SOUTHAMPTON	GB
BRACEBRIDGE	GB	MIDLAND	GB	ST CATHARINES	W
BRADFORD	C	MILTON	C	ST MARYS	W
BRAMPTON	C	MISSISSAUGA	C	ST THOMAS	W
BRANTFORD	W	MITCHELL	W	STONEY CREEK	C
BROCK	C	N DORCHESTER TWP	W	STRATFORD	W
BURK'S FALLS	GB	NAPANEE	E	STRATHROY	W
BURLINGTON	C	NEWCASTLE	C	SUDBURY	NE
CAMBRIDGE N DUMFRIES	C	NEWMARKET	C	TECUMSEH	W
CASSELMAN	E	NIAGARA FALLS	W	TERRACE BAY	NW
CHATHAM	W	NIAGARA ON THE LAKE	W	THAMESVILLE	W
CLINTON	W	NIPIGON	NW	THUNDER BAY	NW
COLLINGWOOD	GB	NORFOLK	W	TILBURY	W
COMBER	W	NORTH BAY	NE	TILLSONBURG	W
COOKSTOWN	GB	NORTH YORK	C	TORONTO	C
CORNWALL	E	NORWICH	W	TRENTON	E
COTTAM	W	OAKVILLE	C	UXBRIDGE	C
DEEP RIVER	E	ORILLIA	GB	VAUGHAN	C
DELHI	W	OSHAWA	C	WALLACEBURG	W
DUNDAS	C	OTTAWA	E	WASAGA BEACH	GB
DUNNVILLE	W	OWEN SOUND	GB	WATERLOO NORTH	C
EAST YORK	C	PARKHILL	W	WELLAND	W
ERIEAU	W	PELHAM	W	WEST LORNE	W
ETOBICOKE	C	PEMBROKE	E	WHITBY	C
EXETER	W	PENETANGUISHENE	GB	WINDSOR	W
FERGUS	C	PERTH	E	WINGHAM	GB
FOREST	W	PETERBOROUGH	C	WOODSTOCK	W
FORT FRANCES	NW	PETROLIA	W	YORK	C
GLENCOE	W	PICKERING	C	ZORRA	W
GLOUCESTER	E	PICTON	E		

LEGEND

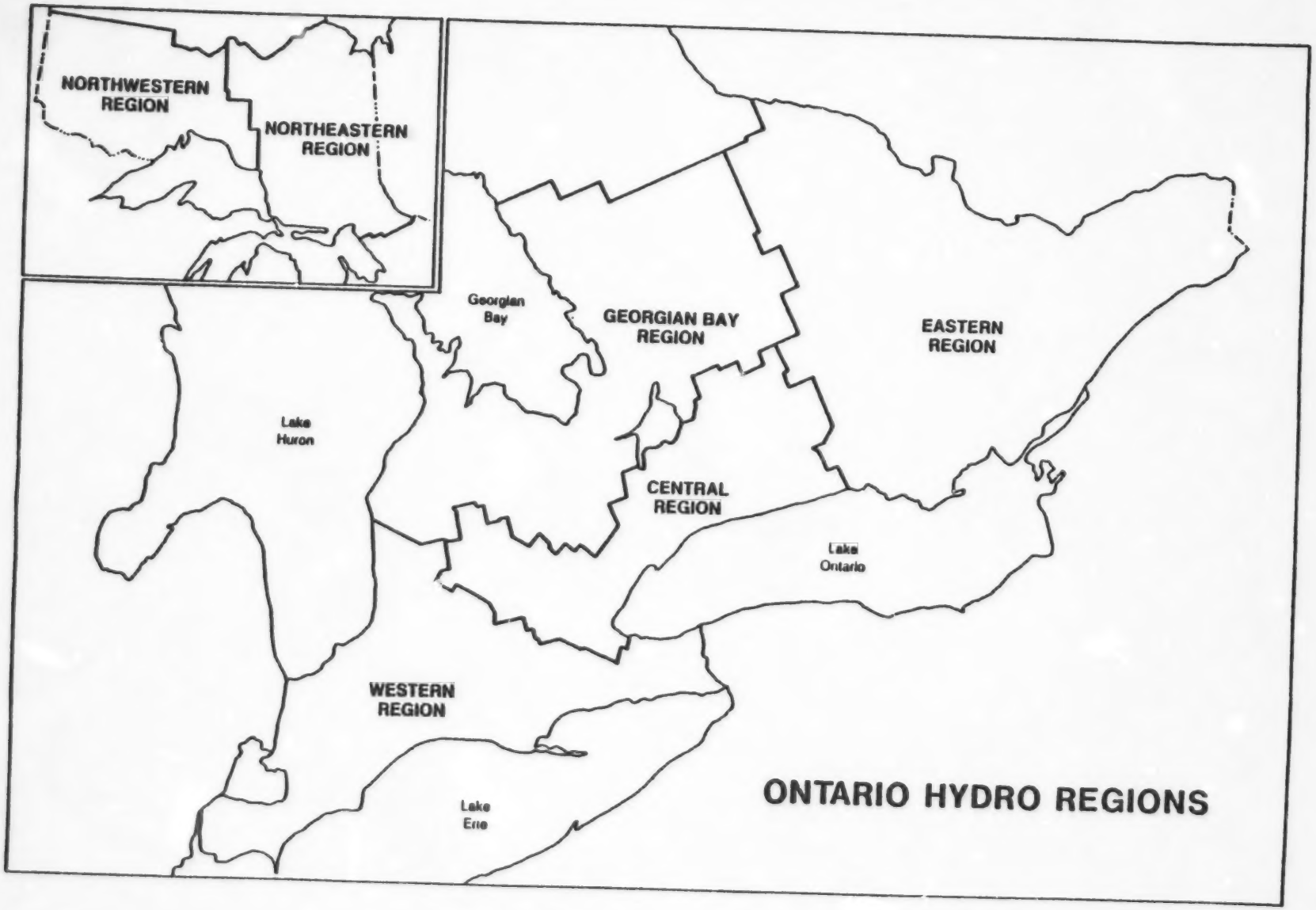
C = CENTRAL
W = WESTERN
E = EASTERN
GB = GEORGIAN BAY
NE = NORTHEASTERN
NW = NORTHWESTERN

LIST OF ONTARIO HYDRO OPERATING AREAS

RURAL OPERATING AREA	REGION	RURAL OPERATING AREA	REGION
ALGOMA	NE	KINGSTON	E
ALLISTON	GB	KIRKLAND LAKE	NE
ARNPRIOR	E	LAMBTON	W
BANCROFT	E	LINCOLN	W
BARRIE	GB	MANITOULIN	NE
BRACEVILLE	W	MINDEN	GB
BOWMANVILLE	C	NEW LISKEARD	NE
BRACEBRIDGE	GB	NEWMARKET	C
BROCKVILLE	E	NORTH BAY	NE
CLINTON	W	ORANGEVILLE	GB
COBDEN	E	OWEN SOUND	GB
COBOURG	C	PARRY SOUND	GB
DRYDEN	NW	PENETANGUISHENE	GB
DUNDAS	C	PERTH	E
EAST ELGIN	W	PETERBOROUGH	C
ELLIOT LAKE	NE	PICTON	E
ESSEX	W	SIMCOE	W
FENELON FALLS	C	STRATHROY	W
FORT FRANCIS	NW	SUDBURY	NE
FRANKFORD	E	THUNDER BAY	NW
GUELPH	C	TIMMINS	NE
HUNTSVILLE	GB	TWEED	E
KAPUSKASING	NE	VANKLEEK HILL	E
KENORA	NW	WALKERTON	GB
KENT	W	WARREN	NE
		WINCHESTER	E

LEGEND

C = CENTRAL
W = WESTERN
E = EASTERN
GB = GEORGIAN BAY
NE = NORTHEASTERN
NW = NORTHWESTERN


NORTHWESTERN REGION
NORTHEASTERN REGION
Georgian Bay
GEORGIAN BAY REGION
EASTERN REGION
Lake Huron
CENTRAL REGION
Lake Ontario
WESTERN REGION
Lake Erie
ONTARIO HYDRO REGIONS

APPLIANCE SATURATION BY REGION

REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	1,598,9590	576,739	398,121	148,326	150,391	68,241	2,910,776
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	94.1	87.7	96.7	95.7	97.2	97.0	93.6
GAS RANGE	7.3	14.3	3.3	4.4	2.7	3.3	7.6
MICROWAVE OVEN	36.3	43.9	38.7	42.6	44.6	48.0	39.1
FROST-FREE REFRIG.	73.6	80.8	75.3	80.2	75.5	77.6	75.7
OTHER REFRIGERATOR	51.9	50.2	52.3	51.6	56.3	53.6	51.9
DISHWASHER	38.1	38.2	40.7	41.3	36.3	36.2	38.5
CLOTHES WASHER	71.3	82.9	77.8	88.1	86.4	85.0	76.3
ELECTRIC DRYER	59.4	66.4	69.9	79.2	75.5	73.7	64.3
GAS DRYER	5.0	11.0	1.1	2.4	1.6	1.8	5.2
COLOUR TV	93.9	94.7	93.4	94.3	95.0	95.3	94.1
B & W TV	23.3	28.9	26.8	26.4	27.7	26.1	25.3
VCR	42.2	37.5	40.5	38.0	40.2	44.2	40.8
PERSONAL COMPUTER	13.4	11.5	13.5	10.6	11.4	10.2	12.8
AIR CLEANER	12.5	11.9	9.1	5.8	4.5	6.2	11.0
WINDOW AIR COND.	22.2	28.1	17.0	11.8	7.2	6.5	20.9
CENTRAL AIR COND.	23.0	22.5	13.9	5.1	1.5	3.2	19.2
FURNACE HUMIDIFIER	30.2	32.5	21.3	18.1	18.5	17.1	27.9
ELECTRIC WATER HEATER	36.2	36.5	68.6	77.6	59.8	51.9	44.4
GAS WATER HEATER	53.9	59.9	25.4	18.5	34.7	44.8	48.1
ELECTRIC SPACE HEATING	15.9	16.5	31.8	40.2	34.8	24.6	20.6
GAS SPACE HEATING	60.0	68.5	30.4	24.1	41.6	51.7	53.3
OIL SPACE HEATING	16.7	13.8	34.0	30.6	19.4	18.6	18.8
WOOD FURNACE	.7	1.7	5.3	7.6	6.5	10.3	2.4
HEAT PUMP	3.1	2.2	3.3	1.9	.4	.5	2.7

APPLIANCE SATURATION BY RATE CLASS

RATE CLASS	RURAL RESIDENTIAL			MUNICIPAL		TOTAL
	HIGH DENSITY R1	LOW DENSITY R2	FARM	SINGLE METERED	BULK METERED	
HOUSEHOLDS SURVEYED NOVEMBER, 1986	204,685	194,742	93,531	1,887,552	503,977	2,910,776
APPLIANCES	%	%	%	%	%	%
ELECTRIC RANGE	94.6	93.0	90.7	92.3	98.5	93.6
GAS RANGE	5.8	7.3	9.5	9.3	1.5	7.6
MICROWAVE OVEN	49.7	47.0	44.6	41.4	22.2	39.1
FROST-FREE REFRIG.	84.3	80.6	79.9	82.4	44.5	75.7
OTHER REFRIGERATOR	50.4	53.5	55.7	48.6	63.3	51.9
DISHWASHER	45.4	40.8	43.6	43.4	16.2	38.5
CLOTHES WASHER	93.2	92.2	93.2	87.2	19.2	76.3
ELECTRIC DRYER	84.0	81.2	80.7	72.0	18.0	64.3
GAS DRYER	3.6	2.6	3.7	6.9	.7	5.2
COLOUR TV	96.5	93.3	90.9	94.8	91.2	94.1
B & W TV	31.2	29.5	31.3	26.6	16.9	25.3
VCR	46.1	42.2	31.7	44.0	28.2	40.8
PERSONAL COMPUTER	13.6	12.7	10.1	14.8	5.5	12.8
AIR CLEANER	7.7	7.7	5.8	13.7	4.7	11.0
WINDOW AIR COND.	16.6	12.3	12.7	21.1	27.9	20.9
CENTRAL AIR COND.	10.6	12.7	6.7	24.3	10.4	19.2
FURNACE HUMIDIFIER	22.3	16.6	18.3	37.6	.2	27.9
ELECT. WATER HEATER	67.8	88.5	87.5	39.3	27.5	44.4
GAS WATER HEATER	28.5	5.9	7.2	55.0	55.0	48.1
ELECT. SPACE HEATING	35.6	41.2	16.6	14.7	28.8	20.6
GAS SPACE HEATING	33.6	7.7	8.9	62.9	52.0	53.3
OIL SPACE HEATING	26.4	40.8	60.6	17.8	3.1	18.8
WOOD FURNACE	4.2	14.5	20.1	.7	0.0	2.4
HEAT PUMP	2.9	4.0	2.8	3.0	.6	2.7

APPLIANCE SATURATION BY HOUSING TYPE

HOUSING TYPE	SINGLE FAMILY*	APARTMENTS**
HOUSEHOLDS SURVEYED NOVEMBER, 1986	2,049,805	638,683
APPLIANCES	%	%
ELECTRIC RANGE	92.4	98.4
GAS RANGE	9.1	1.7
MICROWAVE OVEN	45.1	21.9
FROST-FREE REFRIG.	85.5	44.4
OTHER REFRIGERATOR	48.1	63.5
DISHWASHER	46.5	15.4
CLOTHES WASHER	93.8	19.6
ELECTRIC DRYER	79.0	18.2
GAS DRYER	6.6	.6
COLOUR TV	95.9	90.2
B & W TV	28.0	17.2
VCR	45.9	27.7
PERSONAL COMPUTER	15.4	5.5
AIR CLEANER	13.2	4.6
WINDOW AIR COND.	19.4	27.1
CENTRAL AIR COND.	22.5	9.5
FURNACE HUMIDIFIER	37.2	.3
ELECTRIC WATER HEATER	47.6	30.9
GAS WATER HEATER	49.5	47.4
ELECTRIC SPACE HEATING	18.1	28.7
GAS SPACE HEATING	56.8	45.5
OIL SPACE HEATING	22.8	4.5
WOOD FURNACE	3.0	0.0
HEAT PUMP	3.3	.8

* INCLUDES SINGLE DETACHED, ATTACHED, ROW, TOWNHOUSES, 2-4 PLEXES AND MOBILES
** INCLUDES APARTMENTS OF 5 OR MORE UNITS

APPLIANCE SATURATION BY Kw.h-USE RANGES
SINGLE FAMILY DWELLINGS

ANNUAL ENERGY IN Kw.h	1-5000	5001-15000	15001-30000	OVER 30000
HOUSEHOLDS SURVEYED NOVEMBER, 1986	271,210	979,370	348,037	117,560
APPLIANCES	%	%	%	%
ELECTRIC RANGE	85.7	92.1	96.7	98.2
GAS RANGE	16.1	9.3	3.9	2.4
MICROWAVE OVEN	29.2	44.0	54.3	60.3
FROST-FREE REFRIG.	74.5	86.1	89.0	91.0
OTHER REFRIGERATOR	49.9	48.8	51.0	51.0
DISHWASHER	29.4	44.8	58.6	71.3
CLOTHES WASHER	87.3	94.8	96.5	98.5
ELECTRIC DRYER	59.1	79.5	89.7	94.3
GAS DRYER	8.5	7.5	3.1	1.5
COLOUR TV	92.1	96.7	97.0	97.4
B & W TV	24.7	28.2	30.1	28.6
VCR	33.1	45.1	52.6	57.5
PERSONAL COMPUTER	10.2	13.8	19.8	23.9
AIR CLEANER	10.1	11.9	17.7	20.1
WINDOW AIR COND.	17.1	19.5	18.7	17.1
CENTRAL AIR COND.	19.4	20.6	25.0	26.1
FURNACE HUMIDIFIER	36.7	41.0	31.4	26.4
ELECTRIC WATER HEATER	33.7	39.8	76.9	90.4
GAS WATER HEATER	62.5	57.1	20.7	7.7
ELECTRIC SPACE HEATING	5.3	6.9	43.0	69.7
GAS SPACE HEATING	73.4	67.1	27.2	10.5
OIL SPACE HEATING	21.4	26.4	28.3	16.7
WOOD FURNACE	1.0	2.9	5.5	5.3
HEAT PUMP	1.5	1.3	8.5	10.6

APPLIANCE SATURATION BY AGE
OF SINGLE FAMILY DWELLING

YEAR BUILT	BEFORE 1961	1961-1970	1971-1980	1981-1983	AFTER 1984
HOUSEHOLDS SURVEYED NOVEMBER, 1986	1,033,453	331,520	412,933	93,357	112,479
APPLIANCES	%	%	%	%	%
ELECTRIC RANGE	89.2	93.8	96.6	97.5	97.2
GAS RANGE	2.2	7.9	4.7	3.9	3.8
MICROWAVE OVEN	38.6	50.0	53.3	56.0	57.6
FROST-FREE REFRIG.	82.2	88.6	89.7	91.7	94.9
OTHER REFRIGERATOR	50.9	52.1	44.6	37.2	32.8
DISHWASHER	37.8	54.3	57.3	63.7	60.7
CLOTHES WASHER	91.8	97.0	96.5	97.6	97.1
ELECTRIC DRYER	73.4	81.7	87.3	88.4	90.7
GAS DRYER	7.5	9.1	4.3	3.9	3.4
COLOUR TV	94.8	97.9	97.1	97.3	97.0
B & W TV	27.6	29.2	29.7	25.7	26.3
VCR	38.0	51.6	56.5	56.3	58.6
PERSONAL COMPUTER	11.9	16.9	20.7	22.2	20.3
AIR CLEANER	10.6	16.9	15.4	19.9	16.7
WINDOW AIR COND.	24.4	17.1	14.2	10.6	8.5
CENTRAL AIR COND.	16.0	30.5	29.1	35.2	30.8
FURNACE HUMIDIFIER	33.4	45.3	42.8	43.3	32.9
ELECTRIC WATER HEATER	52.1	42.6	45.6	38.6	37.1
GAS WATER HEATER	44.3	55.1	52.4	60.8	62.3
ELECTRIC SPACE HEAT	11.0	19.1	29.0	30.5	27.0
GAS SPACE HEATING	55.8	61.9	57.1	65.1	69.6
OIL SPACE HEATING	33.4	19.6	13.6	2.9	1.4
WOOD FURNACE	2.9	2.0	3.8	4.4	2.9
HEAT PUMP	2.8	1.0	3.6	8.0	4.5

APPLIANCE SATURATION BY REGION
FOR MUNICIPAL SINGLE METERED RESPONDENTS

REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	1,133,790	367,737	211,971	54,863	75,585	43,605	1,887,552
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	92.5	86.5	97.7	95.1	97.3	98.6	92.3
GAS RANGE	9.4	15.8	2.4	5.1	3.0	1.9	9.3
MICROWAVE OVEN	40.3	44.6	37.7	42.6	45.1	50.5	41.4
FROST-FREE REFRIG.	82.6	84.9	78.8	81.5	78.0	83.6	82.4
OTHER REFRIGERATOR	48.0	48.2	48.7	50.0	55.5	52.1	48.6
DISHWASHER	44.8	39.8	44.2	41.5	40.3	39.1	43.4
CLOTHES WASHER	86.8	90.4	73.7	86.6	88.3	90.8	87.2
ELECTRIC DRYER	71.1	71.0	73.7	78.0	76.7	78.4	72.0
GAS DRYER	6.7	13.0	1.3	4.0	1.6	2.1	6.9
COLOUR TV	94.7	95.1	93.5	95.6	95.2	96.6	94.8
B & W TV	25.3	30.3	26.4	25.1	30.2	27.2	26.6
VCR	46.1	40.0	42.3	37.7	40.5	46.4	44.0
PERSONAL COMPUTER	16.0	12.7	15.4	9.8	12.5	9.8	14.8
AIR CLEANER	15.2	13.6	12.1	6.5	5.3	7.4	13.7
WINDOW AIR COND.	21.2	27.8	18.5	14.6	7.9	5.6	21.1
CENTRAL AIR COND.	27.7	27.2	18.4	5.5	1.7	3.8	24.3
FURNACE HUMIDIFIER	40.7	40.1	28.8	24.1	22.4	22.1	37.6
ELECTRIC WATER HEATER	37.1	26.6	63.9	59.3	53.5	35.6	39.3
GAS WATER HEATER	56.4	71.0	28.4	37.4	41.1	61.0	55.0
ELECTRIC SPACE HEAT	12.2	10.5	24.2	32.6	31.6	15.7	14.7
GAS SPACE HEATING	65.7	81.6	37.0	49.3	49.5	71.0	64.5
OIL SPACE HEATING	18.5	9.2	35.3	16.1	17.1	11.2	18.3
WOOD FURNACE	.4	.5	1.3	.9	2.0	4.7	.7
HEAT PUMP	3.6	1.8	4.2	1.1	.6	.4	3.0

APPLIANCE SATURATION BY REGION
FOR MUNICIPAL BULK METERED RESPONDENTS

REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	380,277	61,877	49,337	3,125	5,816	3,545	503,977
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	98.4	99.3	98.6	100.0	99.4	100.0	98.5
GAS RANGE	1.6	.8	1.4	0.0	.6	0.0	1.5
MICROWAVE OVEN	21.4	26.1	22.5	18.4	28.8	24.7	22.2
FROST-FREE REFRIG.	44.4	47.1	44.0	54.7	37.9	29.4	44.5
OTHER REFRIGERATOR	63.2	63.1	64.0	45.3	69.8	76.6	63.3
DISHWASHER	16.2	16.4	18.1	3.2	8.3	9.4	16.2
CLOTHES WASHER	19.9	18.2	16.0	19.7	12.8	14.5	19.2
ELECTRIC DRYER	18.8	15.9	15.7	18.1	10.6	14.5	18.0
GAS DRYER	.7	1.8	0.0	0.0	0.0	0.0	.7
COLOUR TV	91.4	91.3	88.8	98.4	90.9	95.3	91.2
B & W TV	16.5	19.4	17.6	16.7	13.4	10.6	16.9
VCR	30.1	23.4	21.9	12.8	26.3	10.6	28.2
PERSONAL COMPUTER	5.7	3.3	7.0	9.5	5.5	1.3	5.5
AIR CLEANER	4.9	4.5	3.4	4.8	6.1	2.3	4.7
WINDOW AIR COND.	26.7	44.4	20.9	9.0	5.3	11.9	27.9
CENTRAL AIR COND.	11.5	4.0	11.6	0.0	3.1	2.3	10.4
FURNACE HUMIDIFIER	.2	.2	.4	0.0	0.0	0.0	.2
ELECTRIC WATER HEATER	22.6	39.1	45.2	47.6	51.2	49.4	27.5
GAS WATER HEATER	56.1	52.0	53.5	42.9	40.4	50.6	55.0
ELECTRIC SPACE HEATING	22.9	43.8	47.5	45.3	61.9	67.0	28.8
GAS SPACE HEATING	53.9	47.0	50.4	45.3	29.7	33.0	52.2
OIL SPACE HEATING	4.0	.8	1.5	0.0	0.0	0.0	3.3
WOOD FURNACE	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HEAT PUMP	.7	1.0	.4	0.0	0.0	0.0	.6

APPLIANCE SATURATION BY REGION
FOR RURAL RESIDENTIAL RESPONDENTS*

REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	69,940	79,947	115,458	73,307	66,802	20,264	425,717
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	96.3	84.9	95.2	96.1	97.0	93.4	93.8
GAS RANGE	3.7	17.5	4.8	4.0	2.6	6.4	6.6
MICROWAVE OVEN	48.8	51.9	47.3	44.4	45.5	47.2	47.6
FROST-FREE REFRIG.	85.2	86.7	82.3	81.3	76.1	73.7	82.0
OTHER REFRIGERATOR	51.5	48.6	52.6	51.5	55.9	51.1	51.9
DISHWASHER	46.2	44.7	44.4	41.8	34.4	35.1	42.3
CLOTHES WASHER	93.3	92.9	92.4	91.1	90.4	84.4	91.7
ELECTRIC DRYER	84.2	77.7	84.8	82.1	79.6	73.7	81.5
GAS DRYER	2.1	10.5	1.0	1.3	1.7	1.3	3.2
COLOUR TV	95.1	95.8	95.5	94.3	95.3	92.8	95.1
B & W TV	27.4	29.4	30.1	26.0	26.1	26.6	28.0
VCR	46.8	40.4	46.4	41.1	41.5	46.1	43.6
PERSONAL COMPUTER	15.1	13.2	13.5	11.4	10.7	12.8	12.9
AIR CLEANER	10.4	11.7	6.9	6.0	3.6	4.5	7.6
WINDOW AIR COND.	15.3	21.2	13.9	11.0	6.7	7.5	13.6
CENTRAL AIR COND.	13.0	20.1	8.6	5.7	1.1	2.3	9.5
FURNACE HUMIDIFIER	25.2	27.0	18.0	15.6	16.0	9.8	19.7
ELECTRIC WATER HEATER	84.1	60.0	82.5	88.8	66.7	85.7	77.3
GAS WATER HEATER	11.3	36.3	12.3	7.3	28.0	10.7	18.2
ELECTRIC SPACE HEATING	38.3	24.3	40.9	50.7	36.6	36.2	38.1
GAS SPACE HEATING	14.5	47.2	14.8	9.4	35.2	15.7	23.1
OIL SPACE HEATING	44.3	25.3	39.7	33.4	22.5	36.2	33.8
WOOD FURNACE	5.9	3.5	10.8	8.8	11.1	22.8	8.9
HEAT PUMP	6.6	4.7	3.2	2.8	.2	.6	3.4

* INCLUDES ONTARIO HYDRO RATE CLASSES R1 AND R2

APPLIANCE SATURATION BY REGION FOR FARM RESPONDENTS

REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	14,952	37,178	21,355	17,031	2,188	827	93,531
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	95.5	86.4	90.8	95.4	95.5	88.0	90.7
GAS RANGE	4.7	15.1	8.0	4.3	2.8	11.6	9.5
MICROWAVE OVEN	46.1	49.6	39.9	39.1	41.1	37.3	44.6
FROST-FREE REFRIG.	80.4	84.8	75.5	76.4	69.0	68.9	79.9
OTHER REFRIGERATOR	54.1	52.6	59.7	58.1	60.3	55.2	55.7
DISHWASHER	47.3	45.3	38.4	45.5	32.4	26.5	43.6
CLOTHES WASHER	93.2	94.6	91.0	92.6	94.6	92.5	93.2
ELECTRIC DRYER	82.5	81.2	77.6	82.2	80.4	76.9	80.7
GAS DRYER	1.7	6.9	1.4	1.8	1.7	4.3	3.7
COLOUR TV	88.2	93.2	90.7	89.7	86.8	84.3	90.9
B & W TV	28.3	30.1	33.5	33.9	31.8	23.3	31.3
VCR	32.6	30.3	35.1	30.5	28.2	26.7	31.7
PERSONAL COMPUTER	12.6	9.5	9.9	10.1	8.0	6.6	10.1
AIR CLEANER	6.8	7.8	4.4	3.3	1.0	2.5	5.8
WINDOW AIR COND.	10.2	18.5	9.9	6.9	4.6	6.5	12.7
CENTRAL AIR COND.	7.8	10.8	2.6	2.6	1.8	2.4	6.7
FURNACE HUMIDIFIER	23.8	22.5	12.6	13.0	8.6	6.6	18.3
ELECTRIC WATER HEATER	89.9	79.2	93.9	94.3	94.0	91.8	87.5
GAS WATER HEATER	4.4	14.7	1.4	1.7	1.3	0.0	7.2
ELECTRIC SPACE HEATING	14.1	13.6	21.2	18.6	21.3	23.7	16.6
GAS SPACE HEATING	6.0	21.5	2.4	2.5	1.8	2.3	10.6
OIL SPACE HEATING	72.0	56.6	64.8	70.1	51.9	52.1	63.2
WOOD FURNACE	16.4	12.6	28.0	28.0	43.2	45.5	20.1
HEAT PUMP	4.2	4.0	1.3	1.1	.3	.7	2.8

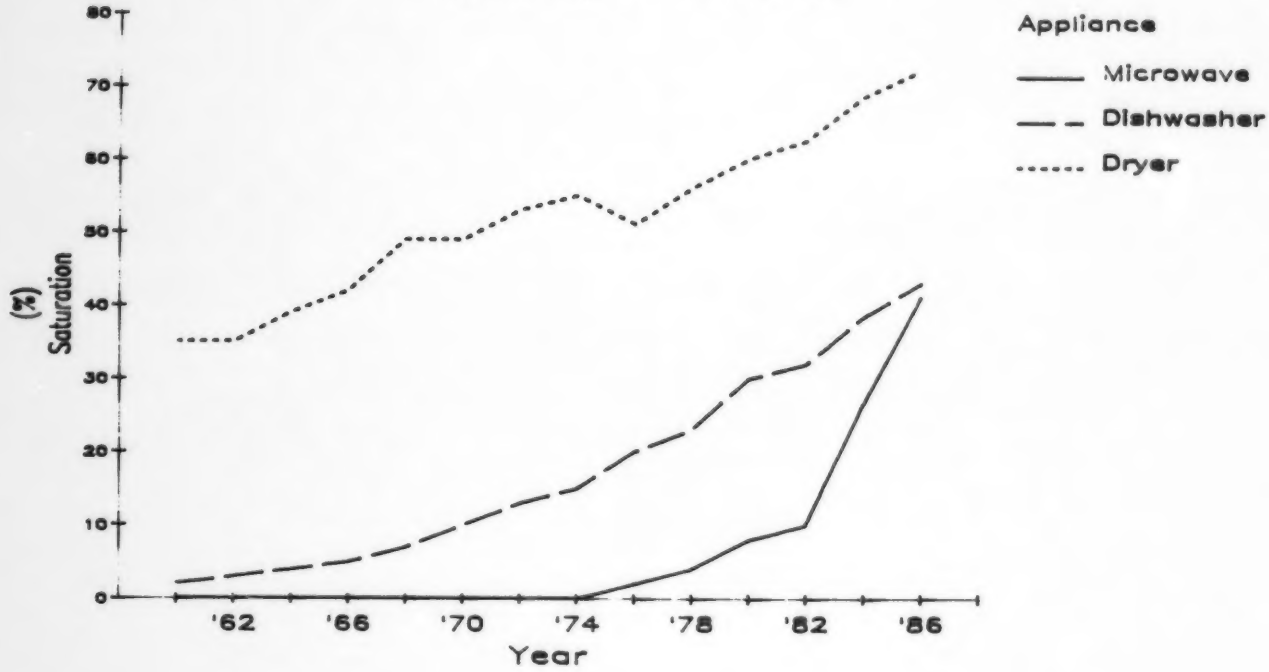
APPLIANCE SATURATION BY REGION FOR SINGLE FAMILY DWELLINGS

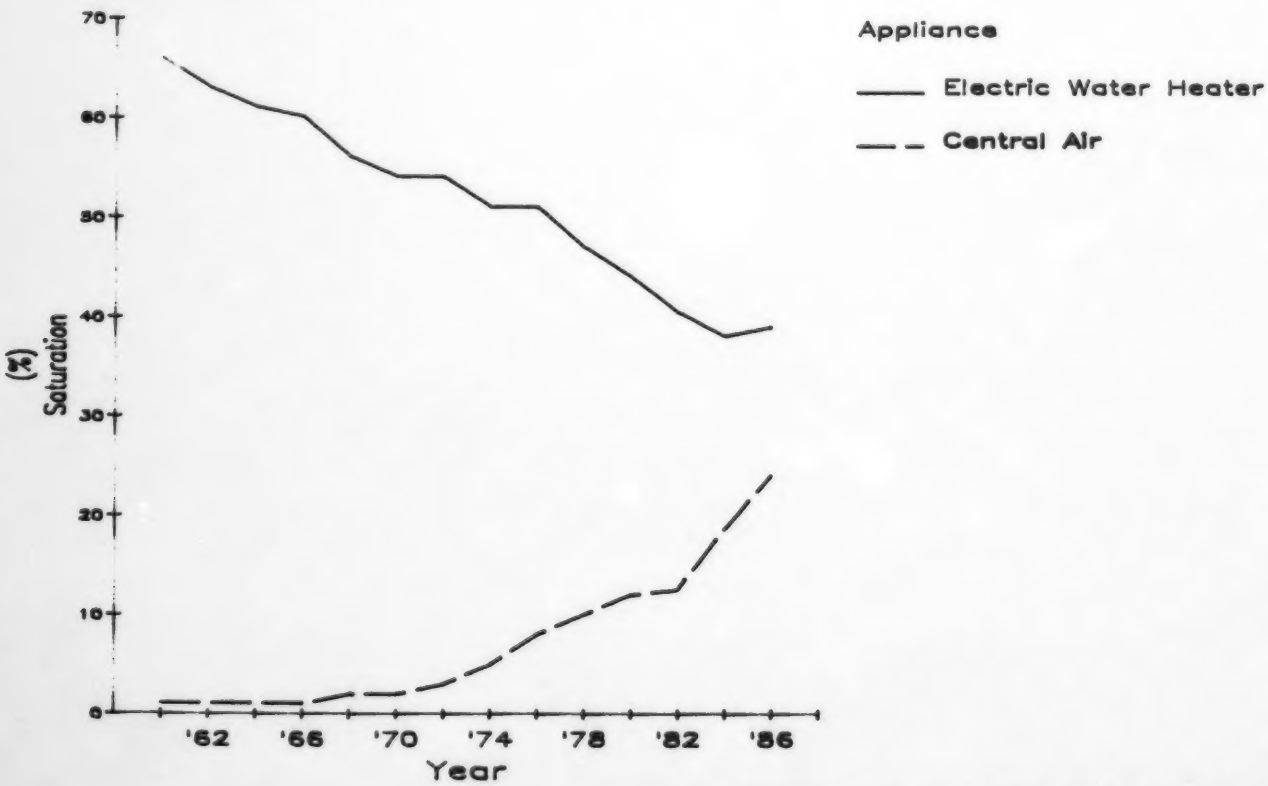
REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	1,031,842	424,886	289,901	126,355	121,553	55,268	2,049,805
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	92.4	86.5	96.4	95.7	97.3	97.0	92.4
GAS RANGE	9.5	15.8	3.6	4.5	2.7	3.3	9.1
MICROWAVE OVEN	43.7	48.0	43.9	45.1	47.2	51.0	45.1
FROST-FREE REFRIG.	87.0	86.8	82.9	82.2	79.8	81.5	85.5
OTHER REFRIGERATOR	46.5	47.9	49.4	51.2	55.0	52.2	48.1
DISHWASHER	48.7	43.4	47.7	44.2	40.4	40.5	46.5
CLOTHES WASHER	94.2	94.2	92.8	92.1	93.8	93.0	93.8
ELECTRIC DRYER	77.9	75.7	83.6	83.6	83.1	81.5	79.0
GAS DRYER	7.0	12.6	1.3	2.4	1.6	2.1	6.6
COLOUR TV	96.1	95.9	95.3	94.9	96.0	96.2	95.9
B & W TV	26.4	30.8	29.4	27.1	29.3	27.6	28.0
VCR	48.7	41.1	46.0	40.5	42.5	48.0	45.9
PERSONAL COMPUTER	17.0	13.4	16.2	11.4	12.6	11.1	15.4
AIR CLEANER	16.0	13.7	10.6	6.3	4.8	6.4	13.2
WINDOW AIR COND.	20.5	25.9	16.5	12.6	7.2	6.3	19.4
CENTRAL AIR COND.	28.7	26.2	14.8	5.4	1.6	3.4	22.5
FURNACE HUMIDIFIER	44.2	39.3	27.0	19.8	21.1	19.1	37.2
ELECTRIC WATER HEATER	40.3	35.1	72.9	78.0	60.0	49.9	47.6
GAS WATER HEATER	57.1	63.0	22.2	19.1	36.0	47.5	49.5
ELECTRIC SPACE HEATING	12.8	12.3	28.9	40.0	33.5	20.5	18.1
GAS SPACE HEATING	66.4	73.3	28.4	24.8	44.1	55.4	58.3
OIL SPACE HEATING	21.6	15.1	40.9	31.1	20.1	20.1	23.4
WOOD FURNACE	.9	1.9	6.3	7.6	7.0	11.7	3.0
HEAT PUMP	4.1	2.5	4.0	2.0	.3	.6	3.3

APPLIANCE SATURATION BY REGION
FOR APARTMENTS

REGION	CENTRAL	WESTERN	EASTERN	GEO BAY	NORTH EASTERN	NORTH WESTERN	TOTAL
HOUSEHOLDS SURVEYED NOVEMBER, 1986	467,940	74,277	72,556	6,000	11,844	6,066	638,683
APPLIANCES	%	%	%	%	%	%	%
ELECTRIC RANGE	98.3	98.6	98.5	100.0	99.2	98.8	98.4
GAS RANGE	1.7	1.5	1.6	0.0	.8	1.2	1.7
MICROWAVE OVEN	21.1	25.3	21.2	23.8	31.1	26.4	21.9
FROST-FREE REFRIG.	43.5	47.2	46.7	53.6	43.9	43.6	44.4
OTHER REFRIGERATOR	63.9	62.7	61.7	51.1	65.1	65.8	63.5
DISHWASHER	15.5	14.7	17.8	10.5	9.7	9.5	15.5
CLOTHES WASHER	19.7	18.7	18.7	22.5	25.2	20.2	19.6
ELECTRIC DRYER	18.7	16.6	17.1	16.7	17.4	16.3	18.2
GAS DRYER	.6	1.6	00.0	.7	.4	0.0	.6
COLOUR TV	90.3	90.5	88.1	93.5	91.8	93.6	90.2
B & W TV	16.8	19.2	17.9	16.1	18.3	16.4	17.2
VCR	29.5	22.2	22.7	17.8	29.1	18.3	27.7
PERSONAL COMPUTER	5.9	3.2	6.0	5.3	3.7	3.5	5.5
AIR CLEANER	4.9	4.1	3.3	4.1	4.2	3.8	4.6
WINDOW AIR COND.	26.7	42.0	20.8	9.4	5.1	8.5	27.1
CENTRAL AIR COND.	10.6	4.1	10.7	2.6	1.9	1.7	9.5
FURNACE HUMIDIFIER	.3	.2	.4	.6	1.5	2.4	.3
ELECTRIC WATER HEATER	25.4	40.3	49.3	51.4	51.3	56.5	30.9
GAS WATER HEATER	48.9	47.5	42.4	32.3	33.7	35.7	47.4
ELECTRIC SPACE HEATING	22.9	42.3	44.3	40.7	51.9	61.1	28.7
GAS SPACE HEATING	47.5	44.3	42.1	36.5	30.5	26.4	45.9
OIL SPACE HEATING	5.1	2.3	5.3	4.7	5.1	1.8	4.7
WOOD FURNACE	0.0	0.0	0.0	0.0	.5	0.0	0.0
HEAT PUMP	0.8	1.0	.9	0.0	.4	0.0	.8

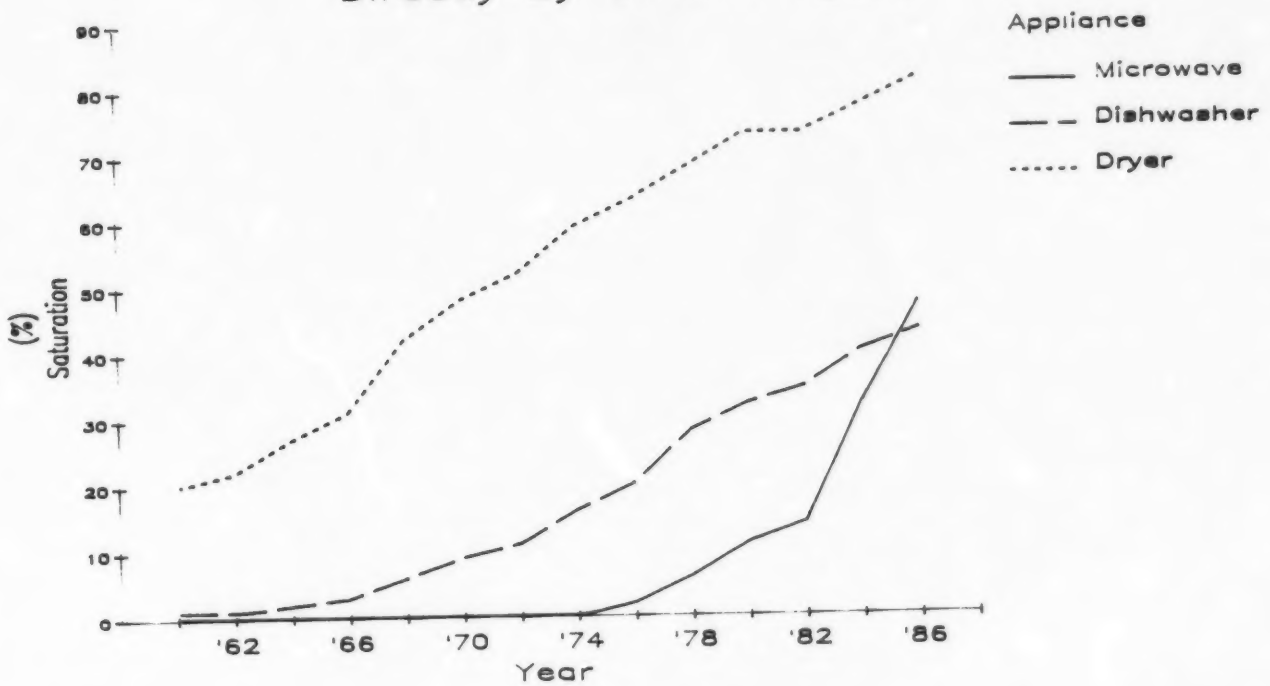
Appliance Saturation
1960 — 1986
Residential Customers Served By Municipal Utilities

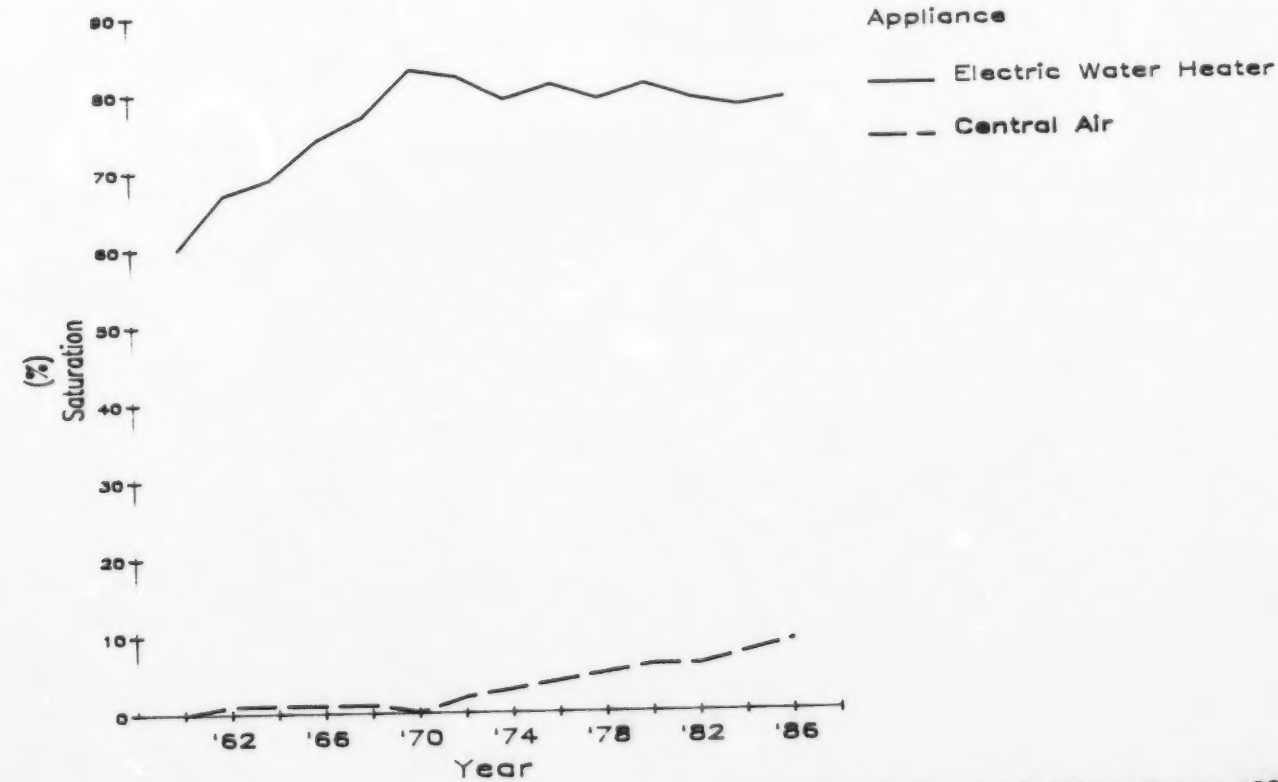




Source: Residential Appliance Survey 1986

Appliance Saturation
1960 — 1986
Residential Customers Served
Directly By Ontario Hydro





Source: Residential Appliance Survey 1986

APPENDIX

SURVEY METHOD

In the summer of 1986, Ontario Hydro asked the 132 participating Municipal Utilities to select a random sample of residential households from their customer masterfile. A random sample of residential and farm households was also selected for each of the 51 Rural Operating Areas from Ontario Hydro's customer masterfile (see pages 5 and 6 for the list of participating Municipal Utilities and Rural Operating Areas).

A sample of bulk-metered apartment dwellers was included to maintain consistency with past survey results. Since there is only one electricity bill per bulk-metered building, questionnaires were addressed to residents of specified suite numbers. The masterfile containing addresses of bulk-metered apartment buildings was provided by the participating Municipal Utilities.

The sample was stratified by size of supply authority and rate class. Of the 126,135 questionnaires mailed, 61,090 useable responses were returned. The response rate of over 48% ensures that the results reasonably represents the survey population and therefore a follow-up mailing was not required.

SAMPLE AND RESPONSE

CLASS OF CUSTOMER	MUNICIPAL		RURAL RESIDENTIAL			TOTAL
	SINGLE METERED CUSTOMERS	BULK METERED APTS	HIGH DENSITY (R1)	LOW DENSITY (R2)	FARM	
TOTAL HOUSEHOLDS SURVEYED AS OF SEPT., 1986	1,887,552	503,977	230,976	194,742	93,531	2,910,776
NUMBER OF QUESTIONNAIRES MAILED	68,317	16,010	16,768	14,365	10,676	126,135
QUESTIONNAIRES MAILED AS A % OF HOUSEHOLDS SURVEYED	3.6%	3.2%	7.3%	7.4%	11.4%	4.3%
NUMBER OF USEABLE QUESTIONNAIRES RETURNED	33,498	4,053	9,592	8,177	5,770	61,090
RETURNS AS A % OF QUESTIONNAIRES MAILED	49.0%	25.3%	57.2%	56.9%	54.0%	48.4%
RETURNS AS A % OF SURVEYED HOUSEHOLDS	1.8%	.8	4.2%	4.2%	6.2%	2.1%

SAMPLE QUESTIONNAIRE

residential appliance survey

Dear Customer

Please help us plan for your future electricity needs by answering the following questions. Upon completion, simply return the form in the enclosed prepaid envelope.

Please do it now while you are thinking about it.

Thank you for your co-operation.
Your Hydro

90011 (front)
rev. 86-07

please detach here

If you live in an apartment building, please complete this form for your own unit only.

PLEASE CHECK ☑ the appliances used in your home and write the NUMBER used in the brackets (____)

	APPLIANCES	NUMBER USED
10	[ ] frost-free refrigerator	(____)
	[ ] other refrigerator	(____)
	[ ] electric range	
	[ ] gas range	
	[ ] wood-burning range	
	[ ] microwave oven	
	[ ] dishwasher	
21	[ ] washing machine	
	[ ] electric clothes dryer	
	[ ] gas clothes dryer	
24	[ ] electronic air cleaner	
	[ ] window air conditioner	(____)
	[ ] central air conditioner	
	[ ] heat exchanger (air to air)	
	[ ] furnace humidifier	
31	[ ] black and white television	(____)
	[ ] colour television	(____)
	[ ] video cassette recorder	
	[ ] personal computer	
39	[ ] electric car block heater	(____)
	[ ] electric swimming pool heater	
	[ ] electric water pump (e.g. for well)	

WATER HEATING

Check fuel used for water heating

44 [ ] electricity [ ] natural gas [ ] oil
47 [ ] propane [ ] other fuel [ ] don't know

If you have replaced your water heater since 1983, check the fuel your previous water heater used

50 [ ] electricity [ ] natural gas [ ] oil [ ] propane
54 [ ] other fuel [ ] have not replaced [ ] don't know

Is your water heater

57 [ ] owned [ ] rented [ ] don't know

HOME HEATING

Check ALL types of heating equipment used in your home

Natural Gas

60 [ ] natural gas forced air furnace
[ ] natural gas hot water furnace (radiators)
[ ] natural gas space heater

Oil

63 [ ] oil forced air furnace
[ ] oil hot water furnace (radiators)
[ ] oil space heater

Electric

66 [ ] electric forced air furnace
[ ] electric hot water furnace (radiators)
[ ] electric built-in heaters (e.g. baseboards)
[ ] electric ceiling cable
[ ] electric heat pump (air to air)
[ ] electric heat pump (ground source)
[ ] electric plenum heater
[ ] plug-in electric heaters

Other Heating Equipment

74 [ ] wood furnace
[ ] slow burning wood stove (air tight)
[ ] conventional wood stove
[ ] fireplace
[ ] propane heater
[ ] solar collectors
[ ] other _____

If you changed from oil heating, check the year this was done

81 [ ] before 1981
[ ] 1981-1983
[ ] 1984
[ ] 1985
[ ] 1986

If you have a gas or oil furnace, is it the "high efficiency" condensing furnace?
(e.g. PULSE, T.H.E., MEGASAVE, ULTRAMAX)

86 [ ] yes [ ] no
88 [ ] don't know

Is natural gas available in your neighborhood?

89 [ ] yes [ ] no
91 [ ] don't know

NOTE: *PLEASE COMPLETE OTHER SIDE OF FORM*

CHARACTERISTICS OF YOUR HOME

Do you live in a

92
- single family detached
- single family semi-detached
- townhouse or row house
- duplex, triplex, fourplex
- apartment (5 or more units)
- mobile home
- other _____

Are you a

99
- home owner
- tenant

Is your home a condominium?

101
- yes
- no

If you are a tenant or own a condominium, how do you pay for the heat and hot water in your home?

103
- heat and hot water included in rent or maintenance fee
- pay utility for hot water only
- pay utility for heat only
- pay utility for heat and hot water

Have you participated in:

107
- Canadian Home Insulation Program (CHIP)
- Canadian Oil Substitution Program (COSP)
- Residential Energy Advisory Program (REAP)

When was your home built

110
- before 1961
- 1961-1970
- 1971-1980
- 1981-1983
- 1984
- 1985
- 1986

Number of rooms in your home ..... (____) 117
(exclude bathrooms, halls, and unfinished rooms)

Number of people living in your household ..... (____) 119

Age of head of household

121
- under 35 years
- 35 - 44 years
- 45 - 65 years
- over 65 years

Please indicate the combined 1985 pretax income from all sources for all members of your household. Your reply is CONFIDENTIAL and will help us assess the impact of electricity rates on various income groups.

125
- under $10,000
- $10,000 - $19,999
- $20,000 - $29,999
- $30,000 - $39,999
- $40,000 - $60,000
- over $60,000

Thank you for your help.